

# REPORT

OF THE

## DEPARTMENT OF THE NAVAL SERVICE

FOR THE

FISCAL YEAR ENDING MARCH 31, 1920

*PRINTED BY ORDER OF PARLIAMENT.*



OTTAWA

THOMAS MULVEY

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

1920







## REPORT

## DEPARTMENT OF THE NAVAL SERVICE

Presented to the House of Commons  
by the Minister of the Naval Service  
March 31, 1921

*To His Excellency the Duke of Devonshire, K.G., P.C., G.C.M.G., G.C.V.O., etc., etc.,  
Governor General and Commander in Chief of the Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith for the information of Your Excellency and the Parliament of Canada, the Tenth Annual Report of the Department of the Naval Service, being for the year ended March 31, 1920, except the Fisheries Branch, reported in a separate publication.

I have the honour to be,

Your Excellency's most obedient servant,

C. C. BALLANTYNE,

*Minister of the Naval Service.*



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FOR THE

Fiscal year ending March 31, 1920

OTTAWA, July 26, 1920.

Hon. C. C. BALLANTYNE,  
Minister of the Naval Service,  
Ottawa, Ont.

SIR,—I have the honour to report on the Department of Naval Service for the year ending March 31, 1920, under the following headings:—

- |                                  |                                |
|----------------------------------|--------------------------------|
| 1. Military Branch.              | 6. Canadian Arctic Expedition. |
| 2. Fisheries Protection Service. | 7. Financial Statement.        |
| 3. Survey of Tides and Currents. | 8. Radiotelegraph Service.     |
| 4. Hydrographic Survey.          | 9. Stores.                     |
| 5. Life Saving Service.          |                                |

(1) MILITARY BRANCH.

ROYAL NAVAL COLLEGE OF CANADA.

Forty-five cadets have been in training at the Royal Naval College of Canada during the school year 1919-20. The progress, both physical and mental, of these cadets is reported upon as highly satisfactory. In April, 1919, eleven cadets passed from the Naval College and all of these proceeded to England, as midshipmen, on loan to the Imperial Navy for training. Four were attached to H.M.S. *Orion*, four to H.M.S. *Erin* and three to H.M.S. *King George V*.

As a result of the cadetship examinations, held in 1919, seventeen successful competitors joined the Royal Naval College in September of that year.

H.M.C. DOCKYARDS.

The Naval dockyards at Halifax and Esquimalt were maintained in operation during the fiscal year 1919-20. Consequent upon the termination of hostilities the activities of the dockyards were very greatly diminished during the year, and a large number of the personnel employed were demobilized. The following work has been carried out: (a) Necessary repairs to ships of the Canadian Naval Service and also to Imperial ships and ships of Allied Governments calling at these ports. (b) Repairs and necessary alterations and reconditioning work to all vessels loaned from other Government departments for service during hostilities, consequent to their being returned in good condition. (c) Necessary refits and repairs to vessels of the



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Fisheries Protection Service, Hydrographic Survey, Fishery Patrol, Canadian Army Service Corps vessels and vessels of other Government departments.

The number of workmen employed at the closing of the fiscal year were: At Halifax, 376, and at Esquimalt, 240.

During March, 1920, orders were issued by the Minister of the Naval Service calling for the complete reorganization of the dockyards so that both establishments may be brought up-to-date and the necessary changes effected to ensure their future operation on lines of strict economy and efficiency.

#### SHIPS.

*Niobe* and *Rainbow* were, throughout the year, maintained as depot ships at Halifax and Esquimalt, respectively. The other vessels were laid up shortly after the termination of hostilities, and they remained out of commission throughout the year.

Whilst the Prime Minister was in London the Admiralty offered to the Canadian Government, as a gift, two submarines, *H. 14* and *H. 15*, which were gratefully accepted by him. These two submarines are modern boats, built in 1916. They have arrived at Halifax but have not yet been commissioned.

#### PERSONNEL.

In the spring of 1919 demobilization of ranks and ratings, entered during the war, took place. Demobilization was practically completed by June 15, 1919. After that date only such officers and men were retained as were necessary for the maintenance of ships and establishments. In March, 1920, the Minister of the Naval Service issued instructions for a complete demobilization of the service preliminary to reorganizing on a pre-war basis. Steps were immediately taken to comply with these orders and instructions given for the discharge of all officers and men who were not essential, or who had not the necessary qualifications to continue in the service under the reorganization. These orders did not affect graduates of the Royal Naval College, whose services it is proposed to utilize in filling the positions for officers in the Naval Department. The usual questions of assigned pay, war service gratuity, pensions, war graves and the issue of badges and decorations were handled in a satisfactory manner throughout the year.

#### LORD JELlicoe's VISIT.

At the Imperial War Conference, held in 1918 in London, it was decided by the Dominion Prime Ministers to ask the Admiralty to send a flag officer of high rank to advise the Dominion Governments on naval affairs. The Admiralty instructed Admiral of the Fleet Viscount Jellicoe to proceed to India and the dominions for this purpose. He arrived in H.M.S. *New Zealand* at Esquimalt on November 8, 1919. The Canadian Government submitted to him a list of questions on which they desired his opinion and advice.

Lord Jellicoe remained on the British Columbia coast until the 19th November and during that time visited the following ports: Esquimalt, Victoria, Port McNeill, and Vancouver. Members of his staff visited Alberni, Barkley sound, and Prince Rupert harbour.

Lord Jellicoe arrived in Ottawa, to confer with the Government, on the 27th November. With Ottawa as a base he and his staff investigated, thoroughly, conditions on the Atlantic coast. They visited the ports of Montreal, Quebec, Halifax,



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St. John, Sydney, Shelburne and Liverpool. He and his staff left Ottawa on the 28th December, 1919.

In his report, which has already been presented to Parliament, Lord Jellicoe submitted four statements showing different combinations of ships which Canada could maintain for certain definite annual sums, namely: five, ten, seventeen and a half and twenty-five million dollars, respectively. The naval force suggested by him, purely for the protection of Canada's trade and ports, under the conditions assumed comprises: 3 light cruisers, 1 flotilla leader, 12 torpedo craft with 1 parent ship, and several auxiliary small craft for training purposes; this fleet was the one suggested under the ten million dollar scheme.

Lord Jellicoe further stated that if either of the two larger schemes, namely, seventeen and a half or twenty-five million dollars, were adopted, real help would also be afforded to Empire naval defence as a whole. In the case of Canada adopting the ten million dollar scheme it was pointed out that whilst she would be in a position to protect her own interests, defensively, it would fall to the lot of the United Kingdom, with the assistance of the other dominions, to successfully carry on naval operations in the event of war, and bring such operations to a successful conclusion.

## NAVAL POLICY OF THE GOVERNMENT.

The following policy adopted by the Government, in connection with Lord Jellicoe's suggestions, was announced by Honourable Mr. Ballantyne in the House of Commons (Hansard, P. 737, March 25, 1920):—

"The Government has had under consideration for some time the question of naval defence of Canada, and the suggestion of Admiral Viscount Jellicoe in reference thereto. In view of Canada's heavy financial commitments and of the fact that Great Britain has not yet decided on her permanent naval policy, and of the approaching Imperial Conference, at which the question of naval defence of the Empire will come up for discussion by the Home Government and the overseas dominions, it has been decided to defer, in the meantime, action in regard to the adoption of a permanent naval policy for Canada.

"The Government has decided to carry on the Canadian Naval Service along pre-war lines, and has accepted the offer of Great Britain of one light cruiser and two torpedo boat destroyers, to take the place of the present useless and obsolete training ships, the *Niobe* and *Rainbow*."

In order to carry out the policy of the Government, to place the Naval Department on pre-war lines, instructions were issued by the minister for the complete demobilization of all naval and civil personnel of the department, both at headquarters and at the dockyards. This reorganization involved a large reduction of staff throughout the department and only the most efficient and necessary employees were retained. At the end of the fiscal year the reorganization of the department had not yet been completed.

## (2) FISHERIES PROTECTION SERVICE.

The Fisheries Protection Service is maintained for the purpose of preventing foreign fishing vessels from fishing in Canadian territorial waters. It is therefore differentiated from the Fisheries Patrol Service in that the latter service is engaged in enforcing observance of the Canadian Fisheries Regulations by Canadian vessels.

The Fisheries Protection Service is divided into three sections, i.e., Atlantic Coast, Pacific Coast, and Great Lakes. On the Atlantic coast, there are three ships in commission. Each of these vessels has a definite area to patrol and their combined activities provide protection for the whole coast. The Pacific Coast service is similarly organized.



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On the Great Lakes one vessel has in the past been in commission but it is now proposed to replace it with three smaller ships which will provide a better system of protection at little additional cost. Lake Erie is the only lake where illegal fishing by American vessels has necessitated the establishment of a fisheries protection service and the service has not been extended to any of the other lakes.

During the past winter ice conditions on the Atlantic coast were bad and caused serious trouble in many of the harbours. The Fisheries Protection ships rendered valuable assistance and were successful in keeping many of the important harbours open to navigation.

During the year 1919-20 a reorganization of the Fisheries Protection Service was undertaken. Several ships which were in use for many years have been replaced by newer and more up-to-date vessels. On the east coast three vessels were in service during the year, i.e., the *Arras*, *Arleux* and *Petrel*. C.G.S. *Vigilant* was utilized in the Great Lakes and on the west coast, the *Malaspina*, *Armentieres* and *Thiepval* were in service.

C.G.S. *Arras* is a single-screw steel ship built by Vickers, Montreal, in 1918. Following are her dimensions: length, 130 feet; breadth, 25 feet; depth, 15 feet; net registered tonnage, 136 tons; speed, 10 knots. She is commanded by Capt. J. E. Morris. The vessel commenced Fisheries Protection duties on the 14th May, 1919, when she proceeded to Magdalen Islands, after which she took up her regular station on the Northumberland Straits Division, where the regular patrol duties, including inspection of life-saving stations in the vicinity, were carried out. With the exception of a short cruise to Rimouski, when convoying the yacht *Bethalma*, and a cruise to Halifax in September, she continued Fisheries Protection duties throughout the season. The *Arras* on the 12th November went to the assistance of the *Lady Evelyn*, stranded on the East End ledges at Pictou island. During the winter the vessel was used for patrol purposes along the Nova Scotian coast and was also employed on ice-breaking for short periods. In March the vessel rendered assistance to the *Robert G. Cann*, ashore at Nett ledge. During the year 1919-20 the vessel steamed 7,334 miles.

C.G.S. *Arleux* is a sister ship of the *Arras*. The vessel is commanded by Capt. W. J. Milne, and during the year she was utilized for the patrol of the Bay of Fundy. She went into commission for Fisheries Protection Service on the 3rd June. En route to the Bay of Fundy her officers inspected the life-saving station at Little Wood island and also investigated charges at Whitehead regarding the conduct of the life-boat crew on the occasion of the stranding of the ss. *Troja* on Old Proprietor ledge. The vessel throughout the season was successful in detecting a number of cases of illegal fishing, and several vessels equipped with illegal gear were warned concerning the use of same. Assistance was rendered during the season to the schooner *J. D. Jenkins*, ashore at Big Duck Island ledge, and also to ss. *North Star*, ashore at Green island. On the 11th December this vessel called at St. John, where Admiral Viscount Jellicoe and party boarded her and proceeded on a tour of the harbour. From January until March, 1920, the vessel was employed principally on ice-breaking duties in the various harbours along the Bay of Fundy.

C.G.S. *Petrel* was in commission on the 1st April, 1919. At the end of April the vessel proceeded to Halifax for refits, but owing to unavoidable delays she was not ready for service until October. She proceeded on her regular patrol route along the Nova Scotian coast, west of Halifax, and carried out life-saving station inspection work as required. During the year this vessel rendered assistance in floating the schooner *Alicante* at Riverport. Valuable service was also rendered to ice-bound ships along the coast. On the 3rd March at La Have she was successful in releasing seven schooners, but in doing so she damaged her own plates to a degree which necessitated her return to Halifax for repairs. On the 17th March the ship put to sea again on her regular patrol duties, during which she undertook to refloat the lightship at Barrington passage. As, however, the lightship was too hard aground, being



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imbedded in a sand bank, the *Petrel* was successful only in taking her stores off and landing them at Barrington.

The report of the *Petrel* shows that the fall run of mackerel was a failure owing to stormy weather, and for the same reason the winter fishing was not very successful. The fishing fleets at Lockeport and Liverpool, however, made good catches of haddock and cod when weather permitted.

C.G.S. *Vigilant* went into commission on the 15th April, 1919, and throughout the season patrolled the international boundary line in lake Erie. Throughout the season a number of attempts at illegal fishing, north of the boundary line, by American tugs were frustrated by the *Vigilant* and many illegally set nets were seized. The *Vigilant* also carried out inspection work in connection with the Life-saving Service on the Great Lakes. The ship went into winter quarters in December, 1919. It has been decided not to recommission the *Vigilant* for Fisheries Protection work but to replace her by three vessels with headquarters at Port Dover, Port Stanley and Kingsville.

C.G.S. *Malaspina* was the only Fisheries Protection vessel in commission on the west coast until the middle June, 1919, when the *Armentieres* and *Thiepval* arrived from the Atlantic coast and were placed in commission. With the exception of short periods in dockyard for refit and repair the vessel continued on Fisheries Protection Service practically throughout the year with an exception of a short time in November when Admiral Viscount Jellicoe boarded her for a cruise of the west coast, after which the vessel acted as tender to H.M.S. *New Zealand* until that vessel left Pacific Coast waters. During February and March Fisheries Protection duties, including the protection of seal herds, were carried out.

C.G.S. *Armentieres* is a sister ship of the *Arras*. The *Armentieres* arrived at Esquimalt on the 4th June and shortly afterward went into drydock hands for repairs after her long journey from Halifax. In October the vessel proceeded on Fisheries Protection duties, and also called at various radiotelegraph stations and life-saving stations with stores. She continued in this service until February when she docked for minor repairs. After these repairs were completed the vessel continued on Fisheries Protection duties until the end of the fiscal year.

C.G.S. *Thiepval* was commissioned in the Fisheries Protection Service in November, 1919. In February, 1920, she proceeded to the west coast of Vancouver island on Fisheries Protection duties, including the protection of seal herds, in which service she continued until the end of the year.

### (3) SURVEY OF TIDES AND CURRENTS.

As this survey is primarily intended as an assistance to navigation, the work of greatest importance is the improvement in methods of calculation for tide tables, and in the data by which the turn of the current can be calculated. These ends are accomplished by the correlation of the movement of the tide with the positions of the sun and moon. This enables the tides for future years to be calculated in advance. The second step is to devise methods by which the turn of the tidal streams can be correlated with the tide, to enable the time of slack water to be computed. Substantial progress has been made in these directions during the year, and as such results are gradually arrived at, they constitute a permanent asset for the country and a basis for navigation for all time to come.

#### OBSERVATIONS AND METHODS OF CALCULATION.

As a basis for the work of this survey, a series of principal stations is maintained in continuous operation throughout the year, on the Atlantic and the Pacific coasts.



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There are six of these principal stations on each coast, and for these the primary tide tables are published. They are so situated that the whole coast line of Canada can be referred to them, as well as the tidal streams and slack water. The improvement in the accuracy of these primary tide tables depends upon the harmonic analysis of the record obtained from the principal stations.

The following harmonic analysis work has been done during the year: four years of record from Quebec, two years from St. Paul island, two years from Charlottetown, and one year from Father Point. In addition to these an analysis has been made from four years of the early record at Southwest point, Anticosti. This is an important point at the entrance to the St. Lawrence estuary, for which it is important to determine the harmonic constants. The preparation of this record for analysis involves considerable work; as it is necessary to maintain a datum level at a constant elevation at the tidal stations for the measurement of heights and to eliminate all time errors from the work. Any breaks or interruptions which occur have also to be dealt with, and filled in if possible by some system of interpolation. The tide stations on the Pacific were brought up-to-date in this respect in the previous year.

A comprehensive scheme has been devised for the improvement of the tide tables at Quebec; as there is considerable trouble in some winters from ice which so blocks the channelway that the action of the tide is interfered with. Tidal observations have been obtained since 1894 with little interruption, and a careful inspection of the series was undertaken. It was found that during seven complete years there was no appreciable disturbance of the tide, summer or winter; and the tidal constants as derived from these, were used to complete breaks of two or three months in the winter season of seven other years. The principal trouble from ice usually occurs in the months of February and March; and in the seven interrupted years referred to, periods of two to three months were omitted where the tide appeared to be irregular or doubtful, because of the river being more or less blocked with ice. By these successive steps, the final tidal constants could be based upon fourteen years of tidal observations; and in the four years last reduced, some months were also omitted and replaced by calculation by means of the tidal constants thus arrived at. It is hoped by these methods that considerable improvement will result for the Quebec tide tables from 1921 onward.

In the passes of British Columbia the time of slack water at which the currents turn is of primary importance to navigation. The tables of slack water, which are published with the tide tables, also enable vessels to know in which direction the current is running between the time of high-water and low-water slack. For one of the most important of these passes, Active pass, a thorough investigation of the method of calculation was undertaken. This was based upon one complete year of observation of slack water obtained in 1916 to 1917. In such observations the night tides are missing as they cannot be obtained; and with a tide of this type the night and day values are the converse of each other in summer and in winter. It is evident that the averages at different seasons are thus thrown out of balance because of the missing night tides. An analysis from all the observations available including an earlier series in 1905 and 1906 was therefore made, based upon the period of the declination month. This analysis afforded a basis for the calculation of the missing night tides in both the high water and low water series, which were treated separately. The year of observation referred to, was thus completed as a continuous series; and the result deduced from this was compared with the calculation values at present in use. It was thus found that both the system and the values were quite trustworthy and required no modification, beyond a change of two minutes. The general method of calculation for Active pass had already been arrived at, by previous investigation. It consists in general, of computation from two different tidal stations with distinction at one of them between the lower low waters and the remaining tides. The outcome of



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this further work, by corroborating the system in use, will establish a sound basis for the calculation of slack water in this pass for future years.

A similar investigation is in progress to verify or improve the calculation values for Seymour narrows. The observations there have been continuous throughout the past winter; and in this case, the turn of the current which is observed in the day-time in winter corresponds with the missing night tides in the summer. When a systematic analysis based upon a complete year of observation is carried to completion the method of calculation arrived at will be entirely trustworthy. The object in this case is to obtain the best possible methods and the best values for the calculation of slack water from the primary tide tables. The methods now in use for Seymour narrows, although quite complex, already give satisfactory results when the calculated times at which the current turns are afterwards compared with the turn as observed.

The investigation of the tide in Miramichi bay has been carried forward another step. The general method by which this tide is calculated, is described in the annual report for the year ending March 31, 1919. It was desired however by mariners, to know definitely which tide of the day is the higher of the two. A method was found by which this could be definitely determined in relation to the tide at St. Paul island. On account of the inversion of the tide which occurs in traversing the gulf of St. Lawrence, the relation connects the height of high water with low water at St. Paul island. From this relation the higher of the two tides of the day can be indicated in the tide tables. Special tables were prepared in manuscript for the present year, and posted up in the pilot office in Chatham, where they will be available to mariners. In future, the indication will be given in the tide tables themselves, now that a method of doing so has been arrived at.

## TIDAL AND CURRENT OBSERVATIONS, DURING THE SEASON OF 1919.

Further observations of the tide were carried out in the Bay of Fundy. Three years previously, special observations were obtained in Cobequid bay at the head of Minas basin, where the tide attains its greatest range. The conditions at the head of the Bay of Fundy were thus thoroughly tested. During the last season an examination of the bay was made to ascertain where complete observations of a similar kind could best be obtained.

The difficulty in the upper part of the Bay of Fundy is that none of the wharves extend beyond half tide. It is thus possible with a registering tide gauge to obtain the time of high water; but to obtain the time of low water and the total range of the tide, it is necessary to make use of tide scales and instrumental levelling. For these complete observations, three localities were selected where the shore was sufficiently clean and rocky to make such work possible. These localities were Hopewell cape and South Joggins in one arm of the bay, and Horton bluff in the other. With the addition of Burntcoat head in Cobequid bay, sufficient observations were thus obtained to enable the data for the whole Bay of Fundy to be revised on a satisfactory basis. The time of low water as well as high water in the upper part of the bay, can thus be given in the tide tables and the range correctly ascertained. The time of high water was also observed at Amherst harbour and Windsor, N.S.; as in these regions this is important for navigation, when vessels leave and arrive at high water. The reduction of these observations which was quite special, need not be detailed; as the result will appear in the tide tables.

A tide gauge was erected again at Portage island, in Miramichi bay, where a full season's observations were obtained to improve the calculation values for that bay. Through the co-operation of the Hydrographic Survey observations were obtained on the St. Lawrence at two localities in the region of Orleans island, and also Ste. Anne des Monts near the mouth of the estuary. These are of value in the reduction of soundings in the chart work as well as to this survey.



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In British Columbia tidal observations were obtained at Bedwell harbour, South Pender, and at Telegraph harbour, Kuper island, which is a secondary station for reference among the Gulf islands. Also, at False creek on the south side of Vancouver, which has recently been filled in at the head and otherwise altered; and it was of value to ascertain the present character of the tide. Further observations of the turn of the current and the time of slack water, were obtained at Camp point, Johnstone strait, throughout the season. This is an important point centrally situated in Johnstone strait on the main line of navigation between southern and northern ports on the coast. The observations in Seymour narrows already referred to, serve a double purpose as they enable the simultaneous observations at the two localities to be compared. The turn of the current at Camp point can be reduced from the slack water tables published for Seymour narrows; and a notice to mariners giving the data for doing so, has been issued. This will be a distinct aid to navigation in these regions.

Further observations of the turn of the current in First narrows at the mouth of Vancouver harbour, have been undertaken to determine the amount of change in time, due to the dredging of the narrows, which has now been completed. The result will enable the slack water tables for those narrows to be calculated with accuracy, by allowance for the slight change which has taken place. Observations of the turn in Second narrows above Vancouver were also undertaken simultaneously, to determine the differences of time between the two. This will enable the turn in Second narrows to be known from the tables of slack water which are now published for First narrows.

Some trial observations were taken at the mouth of the Fraser river and at New Westminster, to determine the time at which the current turns. It was found, however, that such observations could only be successfully undertaken after the freshet in the river was over; and arrangements are being accordingly made for observations during the coming season of a more systematic character under suitable conditions.

#### FRASER RIVER AND BURRARD INLET.

An investigation of the current at the mouth of the Fraser river was carried out at the request of the Public Works Department, in connection with proposed schemes for the improvement of the channel at the entrance to the river. The object in view was to ascertain the strength of the current at the bottom in its relation to scour, and also the extent of any cross currents that might occur that would tend to silt up the channelway. The investigation extended from the edge of the mainland across the submerged delta, where the river runs in channels between shallow sand banks as far as the lightship which is anchored in deep water at Sand heads, off the edge of the delta. These investigations were carried on towards the end of August, in the low water period of the river. The velocity of the current near the bottom of the channelway and its direction were obtained by current meters and other appliances. It was found during the freshet season that the tide turned below in the bottom of the channel and ran inwards, while the surface water flowed continuously outward without reversing. It is thus evident that the surface appearance might be quite misleading with regard to the actual flow in the bed of the channel. A full report on the results obtained with special reference to scour and deposit, was prepared and forwarded to the chairman of a committee of engineers which is considering the whole question of improvement to the channel in this region with a view to increasing the draught.

This work was carried out with a steamer supplied by the Public Works Department at New Westminster, which was anchored at suitable points in the channel across the width of the delta. An opportunity was also taken to utilize the steamer for an investigation of Boundary pass, to ascertain the points at which the current in the pass can be observed with best advantage, with a view to extended observations



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during the coming season., This pass is used by the ocean-going traffic from Vancouver to Victoria.

## TIDE LEVELS AND DATUM.

In connection with an extended survey which is being carried on by the Geological Survey as a basis for a contoured map of the lower Fraser region, including Burrard inlet, it was necessary to decide upon low-water levels as well as the average level of high water. On consultation with representatives of the Geological Survey and the Public Works Department, a series of low-water data between Sand Heads and New Westminster were decided upon to correspond with the decreasing range of the tide in the river. Also, the true levels of high water along the Fraser, in Vancouver harbour and throughout Burrard inlet, were carefully determined from available tidal observations during a long period. This is a question of importance, as the high water line forms the property limit along the shore.

At the request of the provincial authorities in Victoria, a similar calculation to determine the true level of high water was carried out for points on Vancouver island, on the same system as the determinations for the Fraser river and Vancouver. This was done for Victoria, Union in Baynes sound, and Comox, and limits were given for the extension of the Victoria high-water level as far as Sooke in the one direction, and half way to Sidney in the other. In all cases these levels are referred to benchmarks so that they can be correctly laid out as contour lines by surveyors by means of instrumental levelling. It is important to have this level correctly determined in relation to the type of the tide, to avoid disputes; as it is the legal boundary of properties along the seaward side, and it may also define the limits of the jurisdiction of harbour commissioners.

In connection with the proposed dry docks at Esquimalt and Vancouver, tide levels were supplied to the engineers of the works, giving the extreme levels of the tide at high water and low water and other information required for construction purposes.

At Nelson, in Hudson bay, a value for mean sea-level was desired by the Topographical Surveys branch of the Interior Department, to check the levels in Central Canada at a seacoast point. The observations obtained at Nelson do not afford a correct value for this special purpose; as Nelson is in the river where there is still considerable water slope before the open sea is reached. Some special observations were obtained at a point on the open coast seventeen miles from Nelson, by the engineer in charge of the harbour works. This enabled a computation to be made from which a fairly accurate value for mean sea level in that region was deduced.

Tide levels at the following localities was supplied to various engineers and others on request:—At Glace bay, N.S., a comparison of the Geodetic levelling with the tide levels; at St. Andrews, N.B., for the Biological Board; in Miramichi bay, the datum and the range of the tide at points round the bay, for the Public Works Department; at Point Atkinson, B.C., to enable the Geological Survey to check their levels which extend to the entrance to Burrard inlet; at Nanaimo, Sidney and Cowichan, on Vancouver island, at the request of the Public Works Department; at Sydney, N.S., in connection with work in the harbour; at Yarmouth, N.S., to enable a low-water datum to be established by comparison, at Port Maitland. Also, the latest result of the determination of mean sea-level at Father Point, based on fourteen complete years of observation, as a basis for the levels of the Geodetic Survey in that region.

The question of a uniform system for a low-water datum in all our harbours has been discussed in recent years with the chief engineer of the Marine department and the chief hydrographer. This datum has been worked out for all harbours where tidal observations have been obtained by the Tidal Survey, quite beyond the requirements of a datum for tide table purposes. In nearly all cases, both in Eastern Canada and on the Pacific coast, this datum is referred to a local bench-mark; and in our principal harbours it is known with reference to mean sea-level. Because of the low-water



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datum being so widely available, it is now proposed to make its use compulsory for all plans and projects in marine harbours.

#### OTHER INFORMATION SUPPLIED.

There are now nine of our principal tide tables which are supplied to the Hydrographic office of the British Admiralty for publication. Five of these are on the eastern coasts of Canada and four on the Pacific coast. The British Hydrographic office has also been supplied with new information as soon as obtained in the work of this survey. The principal information of this character during the year has been for Northumberland strait and the east coast of New Brunswick, and also the values obtained in the Bay of Fundy for the time and range of the tide. Data have also been supplied to the United States Coast Survey for the turn of the current in nine of the northern passes on the British Columbia coast, which were imperfectly given in the United States tide tables.

The information supplied is frequently worked out specially, as will be noted; and it is very miscellaneous in character, as it includes values for the Establishment at points on the St. Lawrence, supplied to the Hydrographic Survey; the low-water datum for new localities on the Pacific coast; and data for the tide desired by lumber companies at Bonne bay in Newfoundland, or at Bathurst in Chaleur bay.

#### PUBLICATIONS.

In addition to the outside work carried on during the summer season by the staff of this Survey and the reduction required in the office to deduce results from this, the usual tide tables have been calculated and published. Tide tables for the Eastern coasts of Canada are issued in three editions; one as complete edition containing all tidal information, with an issue of twelve thousand (12,000) copies. Two abridged editions of pocket size for the St. Lawrence and the Bay of Fundy, now amount to a total of 23,000. These are used to supply navigators and fishermen who require local information, and a considerable saving in printing the full-sized edition is thus effected. For the Pacific coast, the edition containing all information with the latest results, now amounts to 22,000 copies. The abridged edition for the southern part of British Columbia is so much in demand that 10,500 copies are required. This serves to supply the demand for local tide tables in the region of Vancouver and Victoria. Tide tables for Nelson in Hudson bay are calculated and published for the months of July to October. With these tables data are given for localities in James bay and for Hudson strait.

During the year, a special publication has been prepared entitled "The Tides and Tidal Streams, with illustrative examples from Canadian waters." In this a concise account is given of the character of the tide and its relation to tidal streams and slack water. The tides are grouped in three leading types, corresponding with astronomical conditions, in the endeavour to make the subject more comprehensive and more easily followed. It is hoped that these publications will be of service in the Naval College, and also in preparation for examination as masters and mates. There is little literature on tidal questions which is not either too elementary and incomplete on the one hand, or very abstruse and mathematical on the other. This publication should therefore meet the need on the part of many who desire to understand the matter without an advanced study of mathematics and astronomy. The various types of tides are illustrated by examples taken from the Eastern and Pacific coasts of Canada, where every type of tide that occurs anywhere in the world appears to be exemplified.

The tidal observations obtained during the Canadian Arctic Expedition from 1913 to 1918 have now been reduced and will be published as one of the bulletins of



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the expedition. This publication deals with the result obtained by the southern party along the northern mainland of the continent from Alaska eastward, and also by the northern party exploring among the islands as far as Ellef Ringnes land. The range of the tide and the time values, as far as these can be deduced from the character of the observations, are fully explained. This information should form a considerable contribution to the scanty information previously available in these regions.

## (4) HYDROGRAPHIC SURVEY.

The work of the Hydrographic Branch was carried out successfully throughout the year. Consequent upon the termination of hostilities, the Hydrographic ships which had been during the war, in service with the Canadian Navy were released and returned to the survey. During the summer of 1919, the following parties were employed on outside hydrographic work: Atlantic Coast Survey, Lower St. Lawrence Survey, Great Lakes Survey, Pacific Coast Survey, Automatic Gauges.

## ATLANTIC COAST SURVEY.

The Atlantic Coast Survey party was in charge of Captain F. Anderson and used the steamer *Acadia*. The work of the season consisted chiefly in carrying out sounding operations of the southeast coast of Nova Scotia between Egg island and Liscomb harbour. These operations were carried out to the distance of twenty miles from the nearest land and inshore to shallow water to connect up with previous work of the Admiralty. All outstanding shoals in the area covered were examined and the positions of same were checked.

Triangulation work was extended from Liscomb harbour as far east as Canso, including Cranberry lighthouse, so that a sheet may be plotted for sounding operations in the season of 1920.

Observations for magnetic declination were taken at six points along the shore, namely, McNab island (Halifax harbour), Sheet harbour, Liscomb harbour, Country harbour, Whitehead harbour and Canso. At the first three points, a variation of three minutes was found over similar observations taken in 1916.

During the progress of the offshore sounding, experiments were made with a view of locating the ship from the Radiotelegraph direction finding stations at Chebucto and Canso in hope of ascertaining if offshore soundings could be undertaken by using this method of fixing the position of the ship. Although the results were not totally satisfactory, they show that there is a possibility of this method being perfected.

The hydrographic work of this survey was interrupted considerably during the season owing to the weather conditions.

As a result of the season's work, a new chart, embracing the shore between Liscomb and Egg island will be issued.

## LOWER ST. LAWRENCE SURVEY.

The Lower St. Lawrence Survey party was in charge of Mr. Charles Savary and used the steamer *Cartier*. The ship was not ready for duty until the 9th July, owing to repairs necessary as a result of its service with the Canadian Navy during the war. Survey operations were carried on in the vicinity of Ste. Anne des Monts, Que., with a view of issuing a chart embracing the shore between cap Chat and Magdalen river. This chart will embrace about 55 miles of shore line, part of which will be north of Point des Monts on the north shore.



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Owing to the late start the survey party had, the work necessary to complete the chart was unfinished. It was also considered necessary to have further work performed in the North channel in the vicinity of the Island of Orleans.

During the season about 250 miles of ship soundings and 105 miles of shore soundings were completed. As a result of the work in the North channel a new chart will be issued covering from St. Jean wharf (Island of Orleans) to Stone Pillar.

#### GREAT LAKES SURVEY.

The Great Lakes Survey party was in charge of Mr. H. D. Parizeau and used the steamer *Bayfield*.

The *Bayfield* was handed over to the survey on the 7th June, after which she had to undergo thorough cleaning and repairs at Kingston drydock. While the ship was laid up at Kingston, the inner harbour between the Boat Club pier and LaSalle causeway was sounded out and the results were noted in the chart.

After leaving Kingston, the party carried out a small survey on Point Pelee in an effort to determine the amount of erosion that was taking place at Sand point. This information was required by the Justice Department.

A section of the survey party proceeded to Caribou island and took up their quarters prior to the fitting out of the *Bayfield* and the vessel arrived there only on the 24th July; from that date, the whole party devoted itself to making a survey of the water around Caribou island and between it and Michipicoten island. Several extensive banks were surveyed but no shoal water was found beyond the ordinary reef extending a very short distance from Caribou island. In carrying out this survey work, an extensive system of buoys was successfully operated.

On its return from Caribou island, the party made an examination of a reported danger west of Corbeil Point (Batchawana bay). No danger was found in the position indicated but an investigation showed that the steamer *C. H. McCullough* had gone aground on the shore reef about half a mile west of the lighthouse. The party reached Owen Sound on the 4th of November where the ship was laid up and the crew paid off.

The survey party then returned to Ottawa. As a result of the season's work a photolithograph chart embracing the soundings taken around Caribou and Michipicoten islands will be ready for distribution to the public at the opening of navigation. An engraved chart covering the work is also under preparation.

#### PACIFIC COAST SURVEY.

The Pacific Coast Survey party was in charge of Lt.-Commander P. C. Musgrave and used the Hydrographic steamer *Lillooet*.

The party left Esquimalt on the 22nd April and proceeded north, investigating several reported dangers en route at Cousins inlet and Milbank sound. Prince Rupert was reached on the 15th May and sounding in Hecate strait put under way.

This work continued until about the middle of September when the party proceeded to the mouth of the Fraser river to carry out survey work at the request of the Public Works Department. Extensive detail surveys were undertaken with a view of properly defining the outer limit of the sand banks. The triangulation points for this survey were supplied by the Geological and Geodetic Surveys. The work was completed and the party returned to Esquimalt on the 1st November.

The plans, showing the work, were prepared for the engraver before leaving Esquimalt. One of the party resurveyed Esquimalt harbour. As a result of the last two seasons' work, a new chart of Victoria harbour and one of Esquimalt harbour will be issued shortly and it is also hoped that the new chart of Hecate strait will be ready for publication during the summer of 1920. The plan showing the result of



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the investigation carried on at the mouth of the Fraser river has been handed to the Department of Public Works.

Lt.-Commander P. C. Musgrave died on the 17th February, 1920. Mr. H. D. Parizeau has been appointed to take charge of the Pacific Coast Survey.

## AUTOMATIC GAUGES.

During the year 31 automatic gauges were kept in operation on the Great Lakes and St. Lawrence river, between Port Arthur and Quebec, the majority of them during the entire year.

The results of automatic gauge work for the year are shown on pages— of this report.

## NEW CHARTS ISSUED.

During the past year the following new engraved charts were issued:—

- No. 67, Burlington bay.
- No. 108, Michipicoten island to Oiseau bay.
- No. 112, Nipigon bay.
- No. 215, Pointe des Monts to Father Point.
- No. 74, Lake Erie (eastern portion).
- No. 89, Giant Tomb island to Lone rock.
- No. 211, Father Point to points aux Orignaux.
- No. 142, Lake of the Woods.

The following new photolithographed charts were issued:—

- No. 415, Sydney harbour.
- No. 110, Caribou island to Michipicoten island.

The following re-prints of former issues have been published:—

- No. 54, Lake of Two Mountains, eastern portion.
- No. 55, Lake of Two Mountains, western portion.
- No. 72, Goderich harbour.
- No. 82, Cape Rich to Cabot Head.
- No. 87, Clapperton island to Meldrum point.
- No. 83, Waubashene to Western islands.
- No. 84, Parry sound and approaches.
- No. 99, Key harbour and its approaches.
- No. 50, Lake St. Louis.
- No. 312, Granby bay, Alice arm and approaches.
- No. 100, Georgian bay.
- No. 107, Coppermine point to Cape Gargantua.
- No. 141, Red river to Nelson river (lake Winnipeg).
- No. 302, Digby island to Kennedy island (Chatham sound).
- No. 209, Saguenay river, St. Fulgence to Shipshaw.
- No. 405, Hudson bay and strait.



MONTHLY Mean Water Surface Elevations of "Great Lakes" for 1919, by Automatic Water Gauges and referred to Mean Sea-Level.

Location.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
Port Arthur.....	602.17	601.94	601.86	601.96	602.25	602.50	602.60	602.55	602.47	602.36	602.34	602.20	602.27
Michipicoten Harbour...	602.33	602.14	602.02	601.96	602.24	602.43	602.57	602.59	602.55	602.43	602.42	602.28	602.33
St. Mary's River.....	601.80	601.56	601.36	601.55	601.86	602.00	602.15	602.19	602.13	601.98	602.11	601.91	601.88
Below Locks.....	581.73	581.57	581.62	581.54	581.84	582.01	581.95	581.82	581.62	581.50	581.35	581.57	581.68
Georgian Bay.....	580.91	580.53	580.54	580.87	581.24	581.29	581.25	581.12	580.86	580.57	580.49	580.33	580.83
Lake Huron.....						581.37	581.28	581.16	580.85	580.60	580.51	580.37	
Isle Aux Peche.....	575.44	574.59	575.00	575.49	576.00	576.06	575.89	575.56	575.22	574.92	574.62	574.17	575.25
Fighting Island.....	574.67	573.94	574.28	574.76	575.31	575.47	575.26	574.93	574.64	574.39	574.02	573.74	574.62
Port Colborne.....	572.36	572.07	572.19	572.77	573.44	573.55	573.28	573.09	572.71	572.71	572.33	572.95	572.67
Port Dalhousie.....						248.13	247.85	247.41	246.89	246.43	246.23	245.91	
Toronto*.....	246.10	246.00	246.18	246.80	247.66	248.17	247.88	247.48	246.95	246.45	246.21	245.87	246.82
Kingston.....	246.00	245.90	245.96	246.58	247.41	247.92	247.72	247.32	246.84	246.33	246.03	245.70	246.63

\*Records taken by Toronto Harbour Commission.

MONTHLY Mean Water Surface Elevations for 1919 by Automatic Water Gauges and referred to mean Sea-Level.

Location.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
St. Lawrence River.....													
Prescott.....										245.37	245.11	244.82	
Iroquois, Lock 25.....	228.38	228.14	228.33	229.19	230.23	230.85	230.66	230.12	229.44	228.77	228.43	227.99	229.21
Morrisburg, Lock 24.....	225.01	224.78	224.98	225.73	226.63	227.18	227.03	226.57	225.93	225.36	225.06	224.67	225.74
Cornwall, Lock 15.....						From	26th	154.09	153.86	153.52	153.27	153.22	Till 19th
Lake St. Francis.....					From	24th	152.46	152.25	152.01	151.74	151.69	151.77	
Coteau Landing.....							From	16th	69.00	69.07	69.38	69.84	
Lake St. Louis.....						71.60	69.72	69.03	68.76	68.79	69.11	69.44	69.89
Pointe Claire.....	69.90	69.21	69.36	71.08	72.65			From	24th	67.61	68.08	68.26	
Lachine, Lock 5.....					27.77	25.42	22.10	20.93	20.69	21.10	21.93		
Montreal, Lock 1.....					26.65	24.11	20.69	19.53	19.31	19.71	20.54		
St. Lawrence River.....					25.45	22.73	19.13	17.91	17.71	18.19	19.18		
Varennes.....					22.42	19.50	16.01	14.85	14.69	15.21	16.29		
Lanoraie.....					21.66	18.84	15.55	14.45	14.28	14.73	15.73		
Sorel.....	19.29	18.19	19.20	20.87						14.73	15.73	15.87	17.39
Range Light 2.....			From	7th	20.47	17.43	14.10	12.91	12.71	13.23	14.47		



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## (5) LIFE-SAVING SERVICE.

At the beginning of the fiscal year 1919-20 twenty-nine life-saving stations were in operation, but during the year this number was reduced to twenty-seven, the station at Toronto being turned over to the Harbour Commissioners and that at Cheticamp, N.S., closed down.

On the 9th May, 1919, a fire broke out at the Toronto station. The boat-house, both power boats and a large quantity of equipment were lost, and the coxswain and chief engineer suffered severe burns, in their endeavours to save the boats. As the Toronto station was largely used for the protection of local boating and police work in Toronto harbour, the department considered that the station could more properly be administered by the city authorities and Harbour Commission. An arrangement was therefore made with the Toronto Harbour Commission whereby they would take over all the equipment, including a new power lifeboat, and assume full charge of the life-saving station at Toronto. The department undertook to pay a certain sum each year to cover any expenses which they might incur in protecting general navigation on the lake, in which phase of operations the department was solely interested.

In December, 1919, it was decided that the station at Cheticamp should be closed down. This decision was made after careful consideration of the records of the work performed by the Cheticamp station, which showed that the lifeboat was used for towing power boats with engine trouble or which were out of gasoline. It was considered that the local fishermen could render each other equally efficient service as the lifeboat was giving in such cases, and that it would be better policy to develop a spirit of camaraderie among the fishermen themselves than to operate an expensive station to give such minor assistance. The station was accordingly closed down.

Following is a summary of assistance rendered by the life-saving stations in operation throughout the year.

## NOVA SCOTIA.

*Baker's Cove.*—Volunteer crew. Assistance was rendered to two vessels, the ss. *Grr. Cobb* and ss. *North Star*, which were stranded at Green rock in the vicinity of this station. No lives were lost but the ss. *North Star* became a total wreck.

*Bay View.*—Permanent crew. No wrecks occurred in this vicinity during the year but the lifeboat was called upon on several occasions to look for overdue or disabled fishing boats.

*Duncan's Cove.*—Volunteer crew. Assistance was rendered to the ss. *Bohemian* ashore on Sambro ledges.

*Scattarie.*—Volunteer crew. Assistance was rendered to the crew of ss. *Cape Breton* stranded on Scattarie island. The twenty-two members of the crew were all rescued and taken care of by the life-saving crew.

## NEW BRUNSWICK.

*Little Wood Island.*—Permanent crew. Various disabled fishing and motor boats were towed in by the Little Wood island life boat during the year. Assistance was also rendered to five vessels ashore on different ledges in the vicinity, a watch was also kept on ss. *Troja* stranded on Old Proprietor ledges, until the vessel was removed by a salvage company.

## ONTARIO.

The usual large number of accidents to pleasure boats has been reported for the past year by the Ontario stations. The life-saving stations rendered any assistance possible in each case.



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## BRITISH COLUMBIA.

The power lifeboat stationed at Ucluelet was transferred to Clayoquot life-saving station during the past year. The Clayoquot station reports no casualties for the year.

*Bamfield*.—Permanent crew. Disabled gasoline launches were given assistance by the life boat. The life boat also rendered all possible assistance to Launch 62 which was wrecked through boiler explosion.

## (6) CANADIAN ARCTIC EXPEDITION.

The field work of the Canadian Arctic Expedition, as reported in the annual report for the fiscal year ending March 31, 1919, pages 36 to 41, was completed in 1918. The different scientists of the expedition have been compiling the results of their work in report form and several of the reports are now printed. In order to lessen the expense of publication it has been decided to print the scientific reports separately so that those applying for a report on any particular subject may be given the information without the necessity of supplying the consolidated report. Consolidated reports, however, are also being published for supply to libraries, public institutions and other organizations, where the information contained in the whole report will be required. The report of the Canadian Arctic Expedition is not yet ready for distribution. The public will be informed through the press when it is available.

## (7) FINANCIAL STATEMENT.

The attached financial statement shows the expenditure under the various appropriations, and a revenue of \$502,388.01, received by the department during the fiscal year ended March 31, 1920.

The gross expenditure for the year is \$15,704,168.36; the amount of refunds is \$6,065,291.47, leaving a net expenditure of \$9,638,876.89.

The expenditure on account of H.M.C.S. *Niobe*, *Rainbow*, the submarines, the Royal Naval Hospital (Halifax), the dockyards at Halifax and Esquimalt have been charged to Demobilization and the Royal Naval College to Naval Service Appropriation.



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## DEPARTMENT OF THE NAVAL SERVICE.

## STATEMENT OF APPROPRIATION ACCOUNTS FOR FISCAL YEAR 1919-20.

Service.	Appropriation.	Expenditure.	Balance Unexpended.
	\$ cts.	\$ cts.	\$ cts.
Naval Service.....	600,000 00	209,456 75	390,543 25
Fisheries Protection Service.....	400,000 00	277,555 29	122,444 71
Hydrographic Surveys.....	250,000 00	250,000 00	
Radiotelegraph Service.....	285,000 00	260,391 82	24,608 18
Tidal Service.....	30,000 00	29,948 71	31 29
Patrol northern waters of Canada.....	60,000 00	60,027 72*	27 72
Rewards for saving life and life saving stations.....	100,000 00	79,981 75	20,018 25
Royal Naval College of Canada.....	100,000 00		100,000 00
Fisheries Protection Service, new vessels.....	150,000 00		150,000 00
Customs dues.....	500 00	75 73	424 27
	1,975,500 00	1,167,437 77	808,062 23

\*Grant exceeded.

## FISHERIES.

Salaries and disbursements of fishery officers and guardians, Fishery Patrol Service and oyster culture.....	600,000 00	591,804 11	8,195 89
Building fishways and clearing rivers.....	30,000 00	29,831 72	168 28
Legal and incidental expenses.....	4,000 00	1,840 76	2,159 24
Deep sea fisheries and transportation of fish.....	100,000 00	79,581 75	20,418 25
Fisheries Intelligence Bureau.....	5,000 00	1,614 85	3,385 15
Inspection of canned and pickled fish.....	15,000 00	7,238 28	7,761 72
Fish breeding establishments.....	265,000 00	305,476 75	59,523 25
Marine Biological stations and investigations.....	26,000 00	26,000 00	
Scientific investigation into fisheries.....	10,000 00		10,000 00
Compassionate allowance to Mrs. L. F. Ogilvie.....	1,000 00	1,000 00	
	1,156,000 00	1,044,388 22	111,611 78
Civil Government Salaries.....	238,900 00	188,048 61	50,851 39
Contingencies.....	50,000 00	34,630 54	15,369 46
	288,900 00	222,679 15	66,220 85
Fishing Bounty.....	160,000 00	155,136 70	4,863 00



RECAPITULATION.

	Appropriation.	Expenditure.	Balance Unexpended.
	\$ cts.	\$ cts.	\$ cts.
Naval Service.....	1,975,500 00	1,167,437 77	808,062 23
Fisheries.....	1,156,000 00	1,044,388 23	111,611 78
Civil Government.....	238,900 00	188,048 61	50,851 39
Contingencies.....	50,000 00	34,630 54	15,369 46
Fishing bounty.....	160,000 00	155,136 70	4,863 30
	3,580,400 00	2,589,641 84	990,758 16
Demobilization appropriation—			
Disbursements.....\$ 7,136,099 94			
Carried from 1918-19..... 2,746,646 92			
	\$9,882,746 86		
Less—			
Reimbursements and credits..... 3,101,842 18		6,780,904 68	
Imperial Government Special Account—			
Disbursements.....\$ 697,587 80			
Carried from 1918-19..... 2,265,861 49			
	\$ 2,963,449 29		
Gross Expenditure.....\$ 2,963,449 29			
Less—			
Reimbursements..... 2,963,449 29			
Net expenditure.....			
Provisional allowance.....		250,438 47	
Miscellaneous gratuities.....		1,334 97	
Consolidated Revenue Fund unappropriated, chap. 140, sec. 79, R.S. 1906.....		16,556 93	
Total net expenditure for fiscal year 1919-20.....		9,638,876 89	

STATEMENT OF REVENUE FOR FISCAL YEAR ENDED MARCH 31, 1920.

Royal Naval College—College fees.. . . . .	\$ 4,615 34
Fisheries revenue.. . . . .	336,590 99
Fish culture revenue.. . . . .	6,925 33
Casual revenue.. . . . .	100,129 42
Wireless apparatus licenses.. . . . .	1,114 00
Wireless operators' examination fees.. . . . .	286 00
Fines and forfeitures.. . . . .	300 00
Premium, discount and exchange.. . . . .	1,290 97
Miscellaneous revenue.. . . . .	813 67
Radiotelegraph service—	
Alert Bay.. . . . .	\$ 4,320 89
Cape Lazo.. . . . .	950 91
Dead Tree Point.. . . . .	3,932 48
Digby Island.. . . . .	10,525 79
Estevan Point.. . . . .	5,801 84
Gonzales Hill.. . . . .	6,695 35
Ikeda Head.. . . . .	569 45
Pachena Point.. . . . .	310 24
Point Grey.. . . . .	7,588 32
Triangle Island.. . . . .	9,236 55
F.P.S. Stadacona.. . . . .	10 70
“ Malaspina.. . . . .	3 90
“ Armentieres.. . . . .	2 60
Camperdown.. . . . .	33 60
North Sydney.. . . . .	17 34
Sable Island.. . . . .	136 72
Barrington Passage.. . . . .	185 61
	50,322 29
	\$502,388 01



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## FISHERIES REVENUE FOR FISCAL YEAR ENDED MARCH 31, 1920.

Provinces.	Amount Collected.	Refunds.	Net Amount.
	\$ cts.	\$ cts.	\$ cts.
Ontario.....	1,421 80		1,421 80
Quebec.....	8,085 78		8,085 78
New Brunswick.....	16,461 02	20 00	16,441 02
Nova Scotia.....	10,220 28	7 00	10,213 28
Prince Edward Island.....	4,781 68	40 00	4,741 68
Manitoba.....	12,154 17	15 00	12,139 17
Saskatchewan.....	4,336 00	15 00	4,321 00
Alberta.....	8,318 85	5 00	8,313 85
British Columbia.....	270,889 41	201 00	270,698 41
Yukon.....	215 00		215 00
	336,893 99	303 00	336,590 99

STATEMENT OF EXPENDITURE UNDER NAVAL APPROPRIATION FOR FISCAL YEAR  
ENDED MARCH 31, 1920.

	Royal Naval College.	Head- quarters.	General Account.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Pay and allowances.....	96,120 10	19,126 95	129 60	115,376 65
Stores and allowances.....	31,737 19	78 72	381 17	32,197 08
Medical Services.....	918 15	16 00		934 15
Cadets miscellaneous expenses.....	198 20			198 20
Recruiting expenses.....			5,775 52	5,775 53
Repairs and maintenance.....	17,457 43			17,457 43
New works.....	920 13			920 13
Miscellaneous effective services.....	30,080 80	3,637 45	37 40	33,745 99
Non-effective pay.....	2,651 59		200 00	2,851 59
	180,083 59	22,849 12	6,524 04	209,456 75

## SUSPENSE ACCOUNTS—DEMOBILIZATION.

	Dr.	Cr.	Balance.
	\$ cts.	\$ cts.	\$ cts.
British Admiralty.....	3,595,876 88	3,070,020 51	525,856 37
“ Ministry of Shipping.....	1,097,806 92	24,313 02	1,073,493 90
French Government.....	13,361 57	3,945 80	9,415 77
Department of Marine.....	69,456 73	60,062 76	9,393 97
“ Militia and Defence.....	28,623 78	24,349 81	4,273 97
“ Railways and Canals.....	69,470 75	68,678 19	792 56
“ Soldiers' Civil Re-Establishment.....	2,239 00	1,631 50	607 50
United States Government.....	191,951 61	97,903 37	94,043 24
Sundries (balance).....	17,935 93		17,935 93
Allotments (balance).....	2,331 92		2,331 92
Advances (balance).....	1,374 14		1,374 14
	5,090,429 23	3,350,909 96	1,739,519 27



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STATEMENT OF JOBS COMPLETED IN THE WORKSHOPS AND STORES SUPPLIED BY HALIFAX AND ESQUIMALT DOCKYARDS DURING FISCAL YEAR 1919-20.

	Halifax.	Esquimalt.
	\$ cts.	\$ cts.
Naval Service.....	559,953 06	322,454 20
Fisheries Protection Service.....	43,806 31	32,999 85
Hydrographic Survey.....	27,432 21	24,073 86
Fishery Patrol Service.....	10,232 59	38,335 56
Radiotelegraph Service.....	13,534 20	1,213 01
Life Saving Service.....	3,339 19	4,361 11
Fish Breeding and Cold Storage.....	4,649 37	
Tidal Service.....	1,113 57	385 14
British Admiralty.....	213,743 14	111,863 39
French Government.....	1,909 53	
U.S. Government.....	{ Credit }	
	{ 3,006 25 }	
Sundries.....	63 20	9,753 16
British Military Mission.....		12,727 99
Department of Marine.....		6,956 20
	(a) 876,770 12	(a) 565,123 47
Wages paid (b).....	455,120 28	245,618 96
Salaries.....	116,091 89	58,126 27
Stores issued (c).....	343,404 57	298,272 16

(b) and (c) included in (a).

(8) RADIOTELEGRAPH BRANCH.

The work of the Radiotelegraph Branch comprises the operation of stations on the east and west coasts, the licensing and inspection of all privately owned stations on ship and shore, the examination of all commercial operators for certificate of proficiency in radiotelegraphy and the administration of the Radiotelegraph Act, including the inspection of all ships plying to Canadian ports to see that they comply with the Canadian law with regard to the compulsory equipment of certain classes of passenger ships with radio apparatus.

The operation of radiotelegraph equipments on land, at sea and in the air for other departments of the Government is also undertaken by the Naval Department.

The primary object of the Government Radiotelegraph Service is to provide facilities for communication with ships at sea and thus assist in their navigation and the safeguarding of the lives of people they carry. Incidentally the service undertakes the handling of commercial messages with ships and also provides means of communication with points not reached by existing land telegraphs, an instance of the latter being the Queen Charlotte Islands, B.C.

The total number of stations in operation in the Dominion and on ships registered therein is 563.

With the exception of the small station at Pictou, N.S., all of the 47 coast stations (44 coast and 3 D.F.) in the Dominion (that is stations communicating with ships at sea) are owned by the Government. Those on the Pacific coast, Hudson bay, Barrington passage, N.S., and the three direction finding stations on the east coast, 16 stations in all, are operated directly by the Department of the Naval Service. The stations on the Great Lakes and the remaining stations on the east coast, 31 in all, which work on a wavelength of 600 metres, whilst owned by the Government, are operated by the Marconi Wireless Telegraph Company of Canada, Ltd., under contract, and under the terms of which that company receives a total annual subsidy of \$89,200, and retains all tolls collected on messages except on Government messages which are handled free.



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The Government-owned and operated station at Barrington passage, N.S., is fitted with 5½ K.W. and 10 K.W. Marconi musical spark sets and a 25 K.W. Poulsen arc set. This station maintains a commercial service with Bermuda on a wavelength of 4,200 metres C.W., and a long distance commercial service with ships at sea on the following schedules: 5.30 to 7.30 G.M.T., 13.45 to 15.45 G.M.T., 17.30 to 19.30 G.M.T., 21.30 to 23.30 G.M.T.

Barrington transmits to ships on a wavelength of 4,000 metres C.W. and stands by on 2,200 metres.

This service has proved very satisfactory to all concerned; distances up to 1,500 miles have been worked over. It is anticipated that the working periods will be greatly extended in the near future.

Barrington also transmits weather forecasts and navigation reports on a wavelength of 1,600 metres spark, at 1.30 and 13.30 G.M.T.

The Marconi station at Glace Bay continues to maintain a transatlantic commercial service with Clifden in Ireland and is, as far as the actual handling of traffic is concerned, considered to be one of the best operated transatlantic circuits. These stations are still operated on the old spark system, but it is understood that the Marconi Companies are contemplating the installation of C.W. equipment in the near future.

The 100 K.W. Poulsen arc transatlantic station at Newcastle, N.B., which was taken over by the Marconi Company in 1919, has not yet been placed in commercial operation. Licenses have been issued to the Marconi Company for point to point stations at Winnipeg, Toronto, Montreal and Glace Bay; these stations will be equipped with 15 K.W. valve type C.W. transmitters and will operate on a wavelength of approximately 3,000 metres. It is understood that the general proposal is to have these stations act as feeders for the Marconi transatlantic service and at the same time carry on a commercial service between the cities above mentioned.

Several radiotelephone stations have been licensed during the year, more particularly a circuit between the main power plant of the Shawinigan Water and Power Company at Shawinigan Falls, Que., and their head office in Montreal, a distance of 82 miles, and several stations by the British Columbia Government in connection with their forestry service. These stations have just been placed in operation and results are awaited with great interest.

*Hudson Bay.*—The Hudson Bay chain of Government coast stations (Port Nelson, Mansel Island, Charles Island and Cape Chidley), extending from Port Nelson to the Atlantic ocean, which was commenced in 1914, is still in suspense.

The Port Nelson station is completed and Mansel Island half completed. No further development work in connection with this chain of stations will be undertaken until the policy respecting the Hudson Bay railway is decided upon.

*Pacific Coast.*—It is proposed next year to divide the ten coast stations operated by the Government on the Pacific coast into two groups, one to handle ship-to-shore business and the other inter-station or ordinary telegraph business.

Under this scheme three of the existing low-power stations, Ikeda Head, Pachena Point, and Cape Lazo, will be closed.

The power of the Estevan station on the west coast of Vancouver island will be increased to 20 K.W. to provide adequate facilities for communication with transpacific ships.

This increase in range will relieve the Triangle Island station from transpacific ship-to-shore working and this station will be transferred to an accessible point at the north end of Vancouver island where the station will provide facilities for communication with the numerous coasting steamers plying on the inside passage.

The Albert Bay station will be placed in the interstation group and will act as a collecting point for the several privately owned licensed stations at pulp-mills, saw-mills, etc., in that vicinity.



The ship to shore station at Point Grey, near Vancouver, will henceforth be devoted exclusively to ship work and a new station will be erected in the vicinity of Vancouver which will act as the terminal station for the inter-station group; this station will have sufficient range to work directly with a similar station on the Queen Charlotte islands and in fact any point on the Pacific coast of Canada.

All inter-station work will be done on C.W.

With reference to private commercial stations on the Pacific coast the Government has adopted the policy of issuing licenses to pulp and paper mills, etc., at points not served by landlines, subject to the condition that these stations must work with the main chain of Government stations along the coast. The operating expenses are borne by the licensees and the Government charges a toll on the traffic handled. There are now five of these stations.

*Direction Finding Stations.*—The Department has undertaken considerable development work in connection with radio direction finding, using the Marconi system. Three stations have been erected on the east coast and have been in operation for the past two years at the following points: Cape Race, Newfoundland; Canso, Nova Scotia; Chebucto Head, Nova Scotia.

The results obtained from these stations have been very satisfactory indeed, and they have proved a valuable aid to navigation.

During the past year the three stations gave out 4,876 bearings.

The erection of two additional direction finding stations will be undertaken next year, one on the east coast and one on the west coast. The station on the east coast will be erected in the vicinity of St. John, N.B., to assist navigation in the bay of Fundy. The location for the station on the west coast is still under consideration. A gradual extension of the service may be anticipated.

*Radiotelegraph Branch, Department of the Naval Service.*—The work of the Radiotelegraph Branch, in addition to the operation of the stations on the east and west coasts above mentioned, comprises the licensing and inspection of all privately owned stations on ship and shore, the examination of all commercial and amateur operators for certificates of proficiency in radiotelegraphy and the administration of the Radiotelegraph Act, including the inspection of all ships plying to Canadian ports to see that they comply with the Canadian law with regard to compulsory equipment of certain classes of passenger ships with radio apparatus; permanent inspectors for the carrying out of these duties are maintained by the department at Ottawa, Victoria, Halifax, Montreal (summer) and St. John (winter).

During the past year 313 operators were examined for certificates of proficiency in radiotelegraphy and 510 certificates have been issued to date.

There are now 281 amateur radiotelegraph stations licensed in the Dominion. Under the regulations the maximum power an amateur may use is one-half K.W., the wavelength varying with the distance between the licensed station and any commercial coast or land station or a route of navigation, viz:—

Within 5 miles.. . . . .	50 metres.
Between 5 and 25 miles.. . . . .	100 "
" 25 and 75 miles.. . . . .	150 "
More than 75 miles.. . . . .	200 "

The Government is anxious to accord all possible privileges to amateurs compatible with non-interference of commercial service.

During last winter special permission was granted to all amateurs from Port Arthur, Ont., to Quebec, P.Q., to use a transmitting wavelength of 200 metres during the closed season of navigation with a view to ascertaining what interference would result from the same.

Generally speaking, the experiment was a success and while interference resulted at certain stations it was in most cases due to badly tuned amateur stations. The experiment will be repeated this coming winter and the results obtained will govern



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to a large extent the Government's policy in regard to wavelength limitations for this class of station.

The total number of radiotelegraph stations in operation in the Dominion and on ships registered therein is as follows:—

Coast stations.. . . . .	44
Direction Finding stations.. . . . .	3
Government Ship stations.. . . . .	51
Licensed Ship stations.. . . . .	145
Licensed Public Commercial stations.. . . . .	2
Licensed Private Commercial stations.. . . . .	11
Licensed Radiotelegraph Training schools.. . . . .	17
Licensed Experimental stations.. . . . .	9
Licensed Amateur Experimental stations.. . . . .	281
Total.. . . . .	563

During the war all licenses for amateur experimental stations were cancelled, but during the present year the department has permitted the reopening of these stations and 281 licenses have been issued.

Operation of Coast Station Service.—The total number of messages and words handled during the year is as follows:—

	Messages.	Words.
East Coast.. . . . .	147,208	2,860,821
Great Lakes.. . . . .	20,157	370,021
West Coast.. . . . .	173,968	2,898,148
Hudson Bay.. . . . .	nil.	nil.
	341,333	6,128,990

The amount of business handled by the East Coast system shows an increase from last year's business amounting to 77,029 messages, containing 1,295,123 words. The Great Lakes system (operated by the Marconi Wireless Telegraph Company of Canada, Limited, under contract) shows an increase of 1,027 messages, with a decrease of 32,916 words. The West Coast system (operated directly by this department) shows a decrease of 726,952 words.

The Hudson Bay system was not in operation during the year.

Revenue.—The total revenue collected during the year amounted to \$50,322.29, as against \$44,288.77 in 1918-19.

Examination for Certificate of Proficiency.—Three hundred and thirteen operators were examined during the year, including 35 re-examinations. One hundred and thirty candidates were successful and 183 failed. The holder of a certificate of proficiency in radiotelegraphy passed a successful examination in the operation of other equipments, and had his original certificate amended accordingly.

Assistance rendered to ships.—Assistance was rendered by the Government Radiotelegraph Service during the year to the following vessels in distress:—

WEST COAST.

S/S "Princess Ena"	S/S "San Juan"
" "Admiral Evans"	" "Shinbu Maru"

EAST COAST AND GREAT LAKES.

S/S "North Star"	" "Schleisinger"
" "Polareon"	U.S.S. "Powhattan"
" "Eagle"	S/S "Bohemian"
" "Hoxie"	U.S.S.B. "Lake Galewood" }
" "Polerland"	U.S.S.B. "Lake Elmdale" }
C.G.S. "Aranmore"	S/S "Hornsee"
S/S "Carmania"	" "Pro Patria"
" "Messina"	" "Noordwijk"
" "Kamerima"	U.S.S.B. "Lake Ellithorpe"
" "Guilford"	S/S "Tewksbury"
" "Langley"	
" "Orion"	
" "Wisconsin Bridge"	



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*Direction Finding Stations, East Coast.*—The Direction Finding stations continue to render valuable assistance to navigators. The following is a summary of bearings given to ships by the three stations on the east coast during the year ended March 31, 1920:—

Station.	Single bearings.	Cross Bearings.		Total.
		2 stations.	3 stations.	
Chebucto Hd.....	765	607	49	1,421
Canso.....	559	438	34	1,031
Cape Race.....	2,200	209	15	2,424
	3,524	1,254	98	4,876

NEW CONSTRUCTION, ADDITIONS AND ALTERATIONS.

WEST COAST.

*Point Grey.*—A temporary 3 K.W., C.W. set was installed and a considerable amount of testing carried out between this station and Alert Bay, Digby Island, Prince Rupert and Queen Charlotte city.

An 8-horsepower engine from Cape Lazo was set up and used in connection with this set.

*Cape Lazo.*—The apparatus and storage batteries were overhauled. A still for the supply of distilled water for the storage batteries was fitted up. One of the 8-horsepower engines was removed for use with the set at Point Grey.

*Estevan.*—The apparatus was overhauled and put in good working order. A new receiving apparatus was installed which has increased the receiving range of the station considerably.

*Alert Bay.*—The apparatus was overhauled and put in good working order. A considerable amount of receiving and testing work was carried out in connection with the 3 K.W., C.W. set and with the testing of new receivers.

*Digby Island.*—The buildings, plant walks and car tracks were repaired. A cover was placed over the water tank and a linen closet and stationery cupboard built. A considerable amount of work was carried out in connection with new arc receiving tests.

EAST COAST.

*Grosse Isle.*—A new operating house was built and a new steel mast set up at this station. A complete new ½ K.W. Marconi cabinet type W/T set was installed, at a total cost of \$6,969.68.

*Chebucto Head.*—The furnace room was altered and facilities for storing a supply of coal provided, also a stairway leading to attic built in the operators' dwelling house.

*Canso.*—A dwelling house for the officer-in-charge was built and a stairway built in the operators' dwelling to provide access to the attic.

*Cape Race.*—A 4-horsepower Fairbanks-Morse gasoline engine direct connected to 2.5 k.w., D.C. generator also Hart type C.L. 7240 A. H. storage battery, and 2 k.w. (120 cycle) transmitter were installed and placed in operation.

*Barrington Passage.*—A directional aerial consisting of four loops about 500 feet long was constructed for working with Bermuda. The installation of the bath, hot



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water tank and heater for operating quarters was completed. The thick growth of underbrush on the station site was thoroughly slashed, stacked and burned. A considerable amount of work was done, in removing stones and levelling off the ground in the immediate vicinity of the station buildings. The road leading from the W/T station to the main coast road was repaired.

## PERSONNEL.

	Government.				Commercial.			
	H.Q.	Cst. Stns.	Ld. Stns.	Shp. Stns.	H.Q.	Cst. Stns.	Ld. Stns.	Shp. Stns.
Engineers and officers in charge.....	4	14	6	14	14	30	10	128
Operators.....		44	7			64	16	10
Other employees.....	12	7	10		96		27	
Executive officials and inspectors.....	4		6		10			
	20	65	29	14	120	94	53	138

Total personnel—553.

## (9) STORES BRANCH.

During the fiscal year under review, the activities of the Stores Branch have been for the greater part of a totally different nature to those of any year since its organization. The functions and the organization of the branch have remained the same, but the conditions and the requirements of the Service generally have changed. Though less active in certain respects, owing to the demobilization of the various war services, and the consequent reduction in naval personnel, these very factors in themselves introduced a phase of supplies work, at once difficult and complicated. Instead of only issuing stores to ships and other establishments involving but comparatively small returns of stores, the Branch was confronted with the task of having large quantities of stores returned into stock within a short period, with all the work of surveying, repairing and disposal to cope with, all of which had to be done with despatch so as not to hinder the dispersment of the forces. There was also the adjustment and reorganization of the different phases of stores work to be taken care of, for the reason that the abnormal requirements during the period of the late war practically disappeared with the cessation of hostilities. Satisfactory progress has been made in these matters, and the way paved for continuing the operations of the Branch under the new conditions.

As in the past, first attention has been paid to the requirements of naval ships and establishments. In all 140 ships of the Canadian Naval Service, including small craft, received continuous service during the year, and 19 of the Imperial Service received occasional service. Large supplies, chiefly of provisions, have been shipped to H.M. victualling yards at Bermuda and Hong Kong. The facilities afforded the Imperial Service have been continued to the mutual satisfaction of both Governments.

In addition to men-of-war and other naval establishments, service has been rendered to all the auxiliary services connected with the department, as well as in several instances other Departments. These include the Radiotelegraph Service, Fishery Protection Service, Hydrographic Survey, Tidal and Current Survey, Life-saving Service, Fish-breeding Service, Fisheries Patrol Service, and the various other fishery establishments throughout the country. The policy of standardization of requirements for these various services has been continued, and considerable progress has been made.

Owing to the comparative inactivity of the year under review, no additions were made to the reserves maintained at the dockyards. Requirements were either filled



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from stock or purchase made direct for the particular service demanding the stores. As in the past, the variety of stores handled by both dockyards and by purchase for delivery direct to outlying establishments has been very extensive. The following is but a generally descriptive list of the stores dealt with: Provisions, uniforms and clothing, and materials for making these; medical supplies, surgical instruments and hospital equipment; lumber; metals of many kinds and in every state of manufacture; hardware and tools; textiles, flags and cordage; packings and canvas goods; paints, lubricating and fuel oils; leather goods, brushes, furniture and furnishings; tackle; charts, meteorological and navigational instruments, and other miscellaneous supplies of almost every description; fuel; and ordnance, ammunition, torpedoes and torpedo stores. The value of stocks maintained during the year approximated in value \$2,619,801 at Halifax and \$749,245 at Esquimalt. In addition to the Canadian stocks above referred to, large quantities of fuel and ordnance stores, the property of the Imperial Government, have been maintained at both the dockyards. The values of these stocks are as follows: At Halifax—fuel, \$170,000; ordnance and ammunition, \$1,300,000. At Esquimalt—fuel, \$21,400; ordnance and ammunition, \$324,500. Because of the absolute necessity for maintaining very large reserves of all stores while the late war was in progress in order to meet any emergency that might arise, the quantities on hand in the case of certain stores are in excess of the requirements of the present or immediate future, as far as these can be foreseen. Accordingly, as soon as the fullest data is available steps will be taken to dispose of whatever surpluses may exist.

The value of transactions handled by both dockyards has been considerably smaller than during the preceding years. At Halifax the value of receipts amounted to \$997,785 and the issues \$755,818;; at Esquimalt the receipts totalled \$286,476 and the issues \$345,252. These figures do not represent in any degree the volume or the complexity of the work which has had to be coped with during the year, owing principally to the fact that the receipts include the returns from ships consequent upon demobilization. Because of the depreciated value of stores on return after being utilized in the service, the quantities of the different articles represented by the above values are necessarily much greater than in the case of ordinary receipts from contractors. Moreover, the survey, classification, repair and subsequent disposal of such stores require particular attention and involve a very considerable amount of additional labour.

The purchasing work of the branch, though not comparable in total value with similar activities of the war, has nevertheless been consistently voluminous. As a general rule, the purchase of large quantities of any given supplies is comparatively less difficult than the purchase of small requirements, inasmuch as the former at once stimulates greater interest on the part of contractors generally, and on the other hand the latter involves practically the same amount of work. The purchases during the year have amounted to \$1,552,060, which have been for the greater part of small requirements. The value of the different classes of stores purchased is as follows: Provisions, \$301,533; clothing and clothing materials, \$63,597; naval stores (including timber, metals and metal stores of all kinds, textiles, electrical stores, scientific and meteorological instruments, miscellaneous packings, oils, paints, etc.), \$427,007; fuel, \$522,942; medical stores, \$4,650; ordnance, ammunition and torpedo stores, \$2,287; stationery and printing, \$122,691, and miscellaneous other purchases, \$107,353. The same procedure for the purchase of supplies has been followed as in past years. Inquiries have been forwarded to all known manufacturers, wholesale establishments and other dealers, thus affording the trade the fullest opportunity to secure the business, at the same time resulting in the purchase of supplies to the best possible advantage. Although the bulk of requirements are purchased direct from headquarters at Ottawa, a considerable proportion of the purchases are effected locally. In all instances, the same procedure governs, and the whole supervised by headquarters. Contracts have been maintained on both coasts for supplies of fresh provisions, etc..



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for the convenience of ships of this service as well as those of the Imperial Government. Expenditures under these contracts are included in the above amounts.

The number of vessels and motor launches employed during the last year of the war in connection with the submarine menace was very great and as no further use could be found for these in the Service, it was necessary that they be disposed of. All told; 17 trawlers and other ships and 11 motor launches were sold, for which \$310,502 and \$4,960 respectively were realized. In all instances sale was advertised in the public press and the fullest opportunity afforded all interested parties to tender. The highest quotations were accepted, except in a few instances, when these were unquestionably too low, necessitating that further tenders be invited or sale made by direct negotiation to the best advantage. In addition to the above, there were large numbers of trawlers and drifters belonging to the Imperial Government to be disposed of in a similar manner. This department accordingly concluded negotiations for the sale of 23 drifters and 7 trawlers.

The system of General Messing, by means of which the victualling of crews is undertaken by the department direct, has been extended to practically all the ships coming under the jurisdiction of the department. Much of the dissatisfaction which was evident under the former system of victualling by stewards under contract has disappeared and an appreciable saving has been effected. In conjunction with the general messing system, a victualling audit has been instituted to determine whether or not the crews are satisfactorily victualled and the food properly and economically handled. If possible, even greater results than were anticipated are being realized under the new system.

The reserves of steaming coal maintained at both dockyards for ships of the Canadian and Imperial services have been reduced considerably during the year; similarly, the value of receipts and issues has fallen as compared with the past few years. At Halifax the total receipt of fuel amounted to 19,558 tons, and the issues were 23,014 tons; at Esquimalt there were no receipts, and the issues were 3,911 tons. The stocks on hand at the end of the year were as follows: Halifax, 14,091 tons; Esquimalt, 1,780 tons. A very considerable part of the above quantities was Admiralty coal, and the value thereof is not therefore included in the stated value of purchases, receipts and issues.

Owing largely to conditions which prevailed during the war, and to the large quantities of stores returned from ships after demobilization, as well as in a measure to the effects of the regrettable disaster of December 6, 1917, which continued to be felt so long as the pressure of work remained very heavy, a general and complete stock-taking of all stores at Halifax Dockyard was started, under supervision of a staff from Headquarters. At the close of the fiscal year this work was still in progress. At Esquimalt the system of biennial stocktaking, whereby the stock is completely reviewed in the course of two years, has been successfully carried on, with satisfactory results.

The audit of all store accounts has been continued with satisfactory results. Not only the dockyards, but all ships and establishments keep store accounts in which receipts and expenditures are fully recorded. It is one of the functions of the branch to control the consumption of all stores so long as their serviceability continues. Each officer responsible for the custody or expenditure of stores of whatever nature must, therefore, make a full accounting for them, reporting direct to Headquarters, where the audit is carried out.

## GENERAL.

I have much pleasure in expressing my satisfaction with the efficient manner in which officers of the department have carried out their duties during the past year.

I have the honour to be, sir, your obedient servant,

G. J. DESBARATS,  
*Deputy Minister.*



